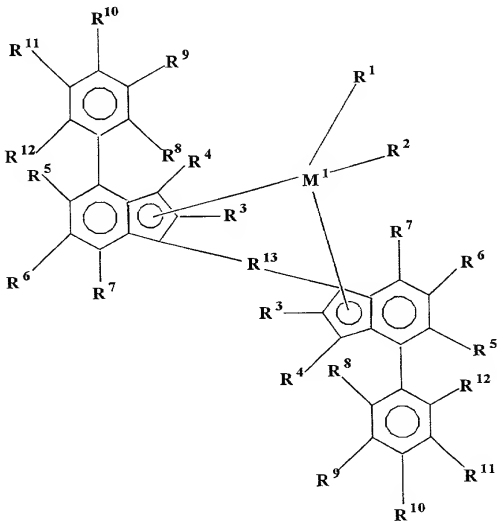
METALLOCENE COMPOSITIONS

ABSTRACT

This invention relates to metallocene compositions and their use in the preparation of catalyst systems for olefin polymerization, particularly propylene polymerization. The metallocene compositions may be represented by the formula:



(I)

wherein M^1 is selected from the group consisting of titanium, zirconium, hafnium, vanadium, niobium, tantalum, chromium, molybdenum and tungsten, preferably zirconium, hafnium or titanium, most preferably zirconium;

R^1 and R^2 are identical or different, and are one of a hydrogen atom, a C_1-C_{10} alkyl group, a C_1-C_{10} alkoxy group, a C_6-C_{10} aryl group, a C_6-C_{10} aryloxy group, a C_2-C_{10} alkenyl group, a C_2-C_{40} alkenyl group, a C_7-C_{40} arylalkyl group, a C_7-C_{40} alkylaryl group, a C_8-C_{40} arylalkenyl group, an OH group or a

halogen atom, or a conjugated diene which is optionally substituted with one or more hydrocarbyl, tri(hydrocarbyl)silyl groups or hydrocarbyl, tri(hydrocarbyl)silylhydrocarbyl groups, said diene having up to 30 atoms not counting hydrogen;

preferably R^1 and R^2 are identical and are a C_1-C_3 alkyl or alkoxy group, a C_6-C_8 aryl or aryloxy group, a C_2-C_4 alkenyl group, a C_7-C_{10} arylalkyl group, a C_7-C_{12} alkylaryl group, or a halogen atom, preferably chlorine;

R^3 are identical or different and are each a hydrogen atom, a halogen atom, a C_1-C_{10} alkyl group which may be halogenated, a C_6-C_{10} aryl group which may be halogenated, a C_2-C_{10} alkenyl group, a C_7-C_{40} -arylalkyl group, a C_7-C_{40} alkylaryl group, a C_8-C_{40} arylalkenyl group, a -NR'_2, -SR', -OR', -$OSiR'_3$ or -PR'_2 radical, wherein R' is one of a halogen atom, a C_1-C_{10} alkyl group, or a C_6-C_{10} aryl group; preferably R^3 is not a hydrogen atom;

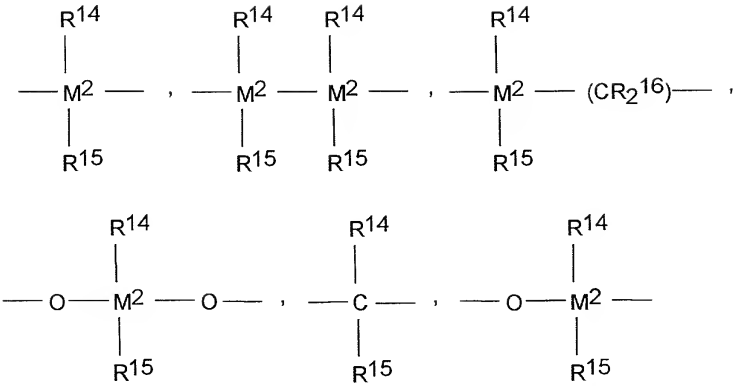
preferably each R^3 is identical and is a fluorine, chlorine or bromine, atom, a C_1-C_4 alkyl group which may be halogenated, a C_6-C_8 aryl group which may be halogenated, a -NR'_2, -SR', -OR', -$OSiR'_3$ or -PR'_2 radical, wherein R' is one of a chlorine atom, a C_1-C_4 alkyl group, or a C_6-C_8 aryl group;

more preferably, R^3 are identical and are each a C_3 alkyl group, most preferably isopropyl groups;

alternatively, R^3 is a C_1 or C_2 alkyl group;

R^4 to R^7 are identical or different and are hydrogen, as defined for R^3 or two or more adjacent radicals R^5 to R^7 together with the atoms connecting them form one or more rings, preferably a 4-8 membered ring , more preferably a 6-membered ring;

R^{13} is



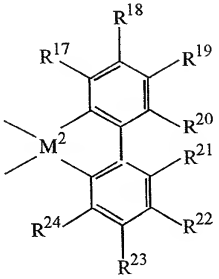
-B(R^{14})-, -Al(R^{14})-, -Ge-, -Sn-, -O-, -S-, -SO-, -SO_2-, -N(R^{14})-, -CO-, -P(R^{14})-, or -P(O)(R^{14})-, or an amidoborane radical;

wherein:

R^{14}, $R^{15}$and R^{16} are identical or different and are a hydrogen atom, a halogen atom, a C_1-C_{20} alkyl group, a C_1-C_{20} fluoroalkyl or silaalkyl group, a C_6-C_{30} aryl group, a C_6-C_{30} fluoroaryl group, a C_1-C_{20} alkoxy group, a C_2-C_{20} alkenyl group, a C_7-C_{40} arylalkyl group, a C_8-C_{40} arylalkenyl group, a C_7-C_{40} alkylaryl group, or R^{14} and R^{15}, together with the atoms binding them, form a cyclic ring;

preferably, R^{14}, $R^{15}$and R^{16} are identical and are a hydrogen atom, a halogen atom, a C_1-C_4 alkyl group, a CF_3 group, a C_6-C_8 aryl group, a C_6-C_{10} fluoroaryl group, more preferably a pentafluorophenyl group, a C_1-C_4 alkoxy group, in particular a methoxy group, a C_2-C_4 alkenyl group, a C_7-C_{10} arylalkyl group, a C_8-C_{12} arylalkenyl group, or a C_7-C_{12}alkylaryl group;

or, R^{13} is represented by the formula:



wherein R^{17} to R^{24} are as defined for R^1 and R^2, or two or more adjacent radicals R^{17} to R^{24}, including R^{20} and R^{21}, together with the atoms connecting them form one or more rings; preferably, R^{17} to R^{24} are hydrogen.

M^2 is one or more carbons, silicon, germanium or tin, preferably silicon;

R^8, R^{10} and R^{12} are identical or different and have the meanings stated for R^4 to R^7;

R^9 and R^{11} are identical or different and are a Group IVA radical having from 1 to 20 carbon atoms or are each primary, secondary or tertiary butyl groups, aryl groups, isopropyl groups, fluoroalkyl groups, trialkyl silyl groups, or other groups of similar size, preferably a tertiary butyl group.